

Valuing Energy Storage

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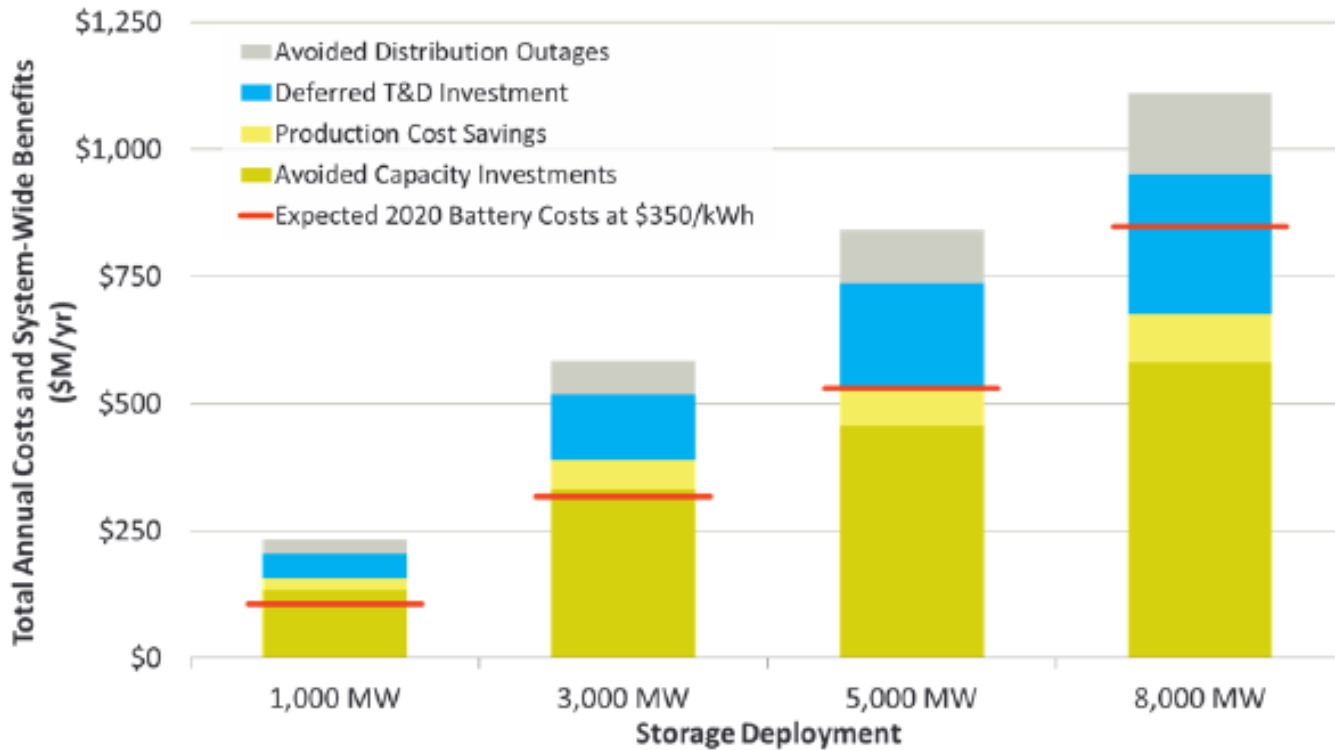


Figure 3. Example Benefit and Cost Calculation

			Gross Value	Load Match Factor	Loss Savings Factor	Distributed PV Value			
			A	×	B	×	(1+C)	=	D
			(\$/kWh)		(%)		(%)		(\$/kWh)
Energy Supply		Avoided Fuel Cost	C1		LSF-Energy		V1		
		Avoided Gen. Capacity Cost	C2	ELCC	LSF-ELCC		V2		
		Avoided Res. Gen. Capacity Cost	C3	ELCC	LSF-ELCC		V3		
		Frequency Regulation	C4	ELCC	LSF-ELCC		V4		
		(Solar Integration Cost)	(C5)		LSF-Energy		(V5)		
Transmission & Distribution		Avoided Trans. Capacity Cost	C6	ELCC	LSF-ELCC		V6		
		Avoided Dist. Capacity Cost	C7	PLR	LSF-Dist		V7		
		Voltage Regulation	C8				V8		
Environmental		Social Cost of Carbon	C9		LSF-Energy		V9		
		Social Cost of SO ₂	C10		LSF-Energy		V10		
		Social Cost of NO _x	C11		LSF-Energy		V11		
Other		Marginal Cost Response	C12		LSF-Energy		V12		
		Avoided Fuel Price Uncertainty	C13		LSF-Energy		V13		
							Total		

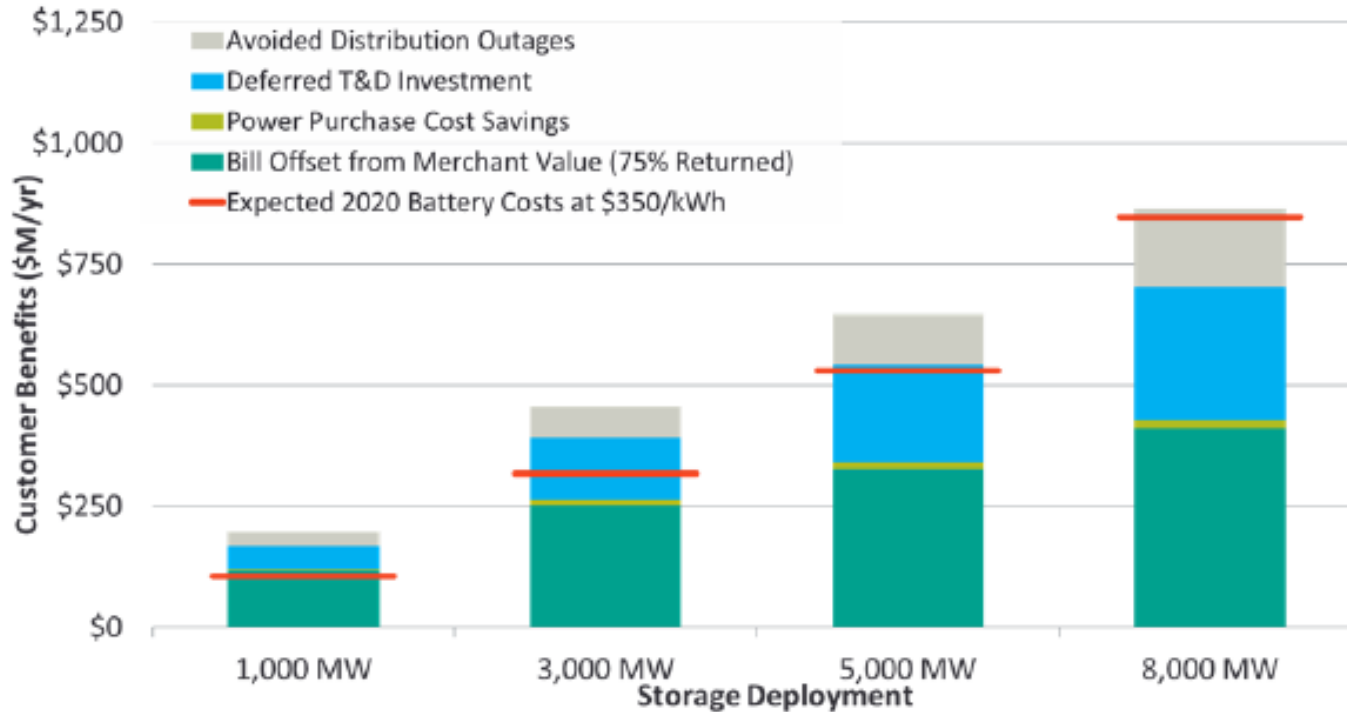
Source: *Valuation of Solar + Storage in Hawaii: Methodology*
 Interstate Renewable Energy Council and Clean Power Research

System-Wide Annual Benefits Compared to Expected 2020 Storage Costs



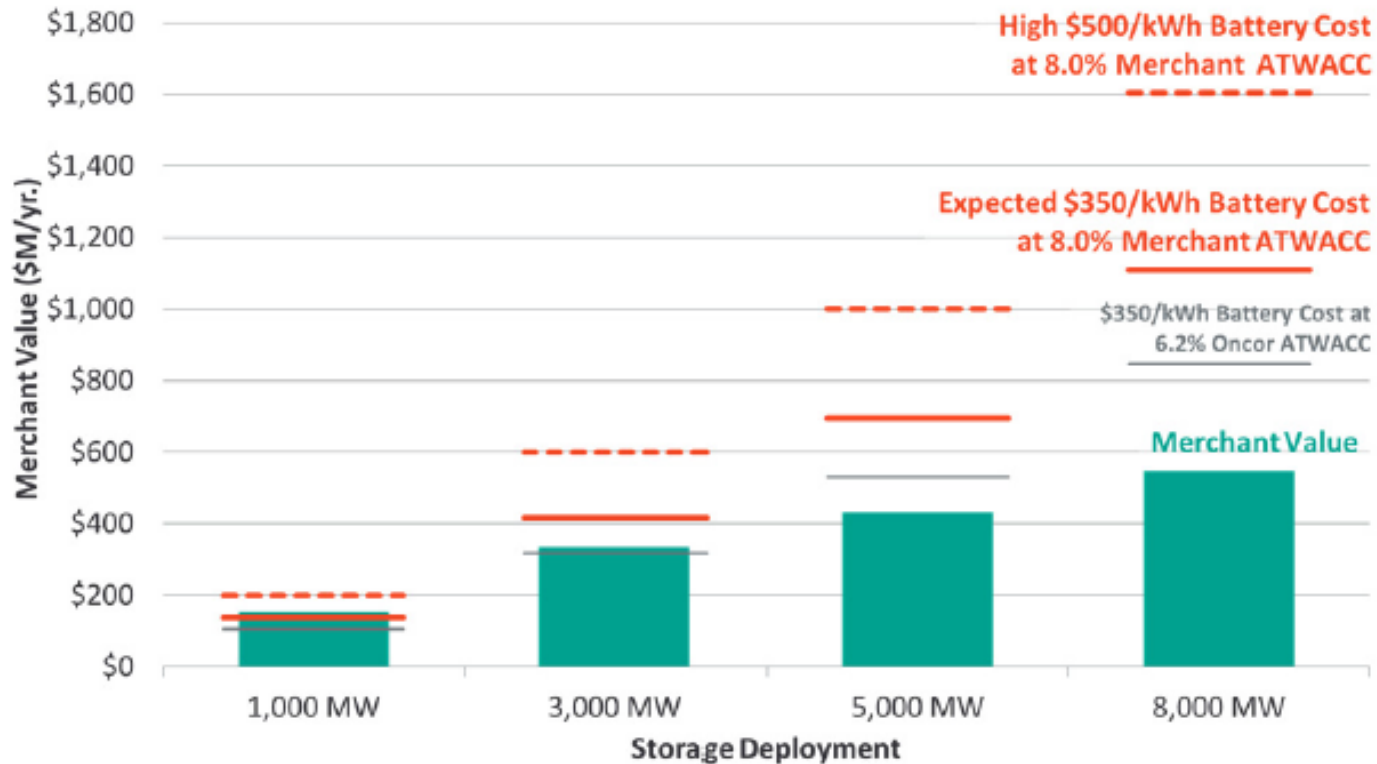
Source: *The Value of Distributed Electricity Storage in Texas*
Oncor and The Brattle Group

Estimated 2020 ERCOT-Wide Customer Benefits and Storage Costs



Source: *The Value of Distributed Electricity Storage in Texas*
Oncor and The Brattle Group

Merchant Storage Value that Could be Captured by Wholesale Market Participants



Source: *The Value of Distributed Electricity Storage in Texas*
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